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Pitcher-Plant Insects—II.

BY FRANK MORTON JONES, Wilmington, Delaware.

(Plate XV, XVI.)

Exyra ridingsii Riley.

In ENTOMOLOGICAL NEWS for January, 1904, a paper with the above title gave the results of a few hours spent among the pitcher-plants of Richmond County, North Carolina, in August of the preceding year. In the territory then examined, *Sarracenia flava* "trumpets" and *Sarracenia purpurea,* our more familiar northern species, were almost equally abundant; *Exyra ridingsii* Riley and *E. rolandiana* Grt. were also present in numbers, and the larva of the former species was illustrated as found feeding in *flava.* Opportunity for a more extended stay among these most interesting plants came again this year; this time at Summerville, South Carolina, where *Sarracenia flava* is especially abundant, but where *Sarracenia purpurea* practically does not occur. Here *ridingsii* was found in numbers, but no *rolandiana,* which suggests that this latter species prefers—perhaps confines itself to—*purpurea,* its known food plant in the north. At Summerville another *Sarracenia, minor* Walt. (*variolaris* Michx.), replaces *purpurea,*

and another *Exyra, semicrocea* Gn. replaces *rolandiana*. These two *Exyra, ridingsii* and *semicrocea,* differ remarkably in some of their habits.

Ridingsii passes the winter in the larval stage in a carefully constructed hibernaculum. These hibernating larvæ occupy sealed chambers low down in the dry stems of the leaves of *flava,* much more rarely in *minor*. This chamber is constructed in the dry corky frass which fills the lower portion of the leaf in which the larva has been feeding, is ceiled with an arched button of closely compressed particles lined beneath with silk, the leaf forming the walls and another accumulation of packed frass the floor. The space occupied by the larva (see Plate XV), is usually about an inch in length, but is sometimes much longer. This portion of the leaf, dry and dead in *flava,* green in *minor,* shows no trace of feeding, though the larvæ become active long before leaving their winter quarters. About April 15th, they leave these hibernacula, rupturing the ceiled roofs and creeping up through the loose frass above. After an interval of several days spent apparently without feeding, during which they may be found in the litter of dry and broken leaves of the preceding year, they creep up the tender new leaves, eat a round hole in the side, and immediately creep in. This occupies only about two minutes, and is the method of entrance without regard to whether the leaf chosen is a mature one, open at the top, or an unopened one. In the former case the larva ceils the open top with a transparent but strong silken web, and sometimes, but rather exceptionally, cuts a groove around the leaf internally, which eventually aids in bringing about the collapse of the upper portion of the leaf. This year, however, fully ninety-five per cent. of the larvæ chose immature, unopened leaves, the earlier leaves having been killed by the late frosts. In these closed leaves the larvæ invariably commence feeding at the top of the leaf, soon causing the hood and closed lips of the leaf to collapse (see Plate XV), thus effectually closing the tube and obviating the necessity for a ceiling web, which, however, is sometimes spun some distance down the tube. The notch-cutting habit was not practiced in any of these immature

leaves. As the larvæ spin a carpet of silk wherever they go, this also aids in keeping the tube effectually sealed and in preventing the opening of the growing leaf. These hibernating larvæ vary greatly in size, and moult at least once before the last larval stage is reached. After taking possession of a leaf, the lower portion of the leaf-tube rapidly fills up with corky frass particles, in which the cocoon is spun, the larva having previously cut two holes through the leaf wall,—a large one above for the emergence of the moth, and by burrowing down in the frass-filled tube, a small one some distance below the location chosen for the cocoon, this second hole being apparently for drainage; just above this drainage hole and between it and the cocoon, the tube is sealed with a lightly spun web, usually not too closely-spun to retain the water (see Plate XV). The small hole where the larva entered the leaf, unless obliterated by feeding or plugged with the accumulated frass, is usually closed with a web. The larva sometimes changes from the old leaf to a new one, and when this occurs just before pupation, unlike *semicrocea*, it eats enough of the new leaf to furnish frass and nibbled particles to render the cocoon opaque; usually, however, the cocoon is composed of the corky frass particles loosely held together with silk, and is built against one side of the tube, the leaf-wall on that side forming one wall of the cocoon. All the pupæ of a midsummer brood examined in Richmond County, N. C., in 1903, were pale amber color; of several hundred pupæ under observation at Summerville, S. C., this spring, nearly all were very dark, some even almost black. The same variation in color of pupæ was noted in *semicrocea*, so the dark pupæ may be characteristic of the spring broods.

The pupa of *ridingsii* is similar to that of *semicrocea*, illustrated by Riley, but the cone-shaped projection over the head is much larger in the former species (Plate XV, upper figures, *ridingsii*, lower figures *semicrocea*). In *ridingsii* the pupal stage lasts ten to twelve days, emergence taking place in the daytime, usually between twelve and four o'clock. The pupa sometimes forces itself through the top of the cocoon before the escape of the moth. Pupation of the spring brood

takes place from May 8th, to May 20th, and the emergence of moths is about complete by June 1st. The moths are extremely variable, some examples being suffused with black to the obliteration of all markings on the wings.

The larva of *semicrocea* has been described and figured by Riley; that of *ridingsii* is very similar, but is slightly larger, measuring fully one inch in length, just before pupation. Its color varies in different examples from brown to a bright reddish-maroon, banded with white between the segments like *semicrocea;* the subdorsal fleshy processes, or lappet-like projections, of the first four abdominal segments are not as large proportionately as in *semicrocea,* and in *ridingsii,* are also present, though of smaller size, on the thoracic segments. *Ridingsii* is noticeably less pubescent than *semicrocea,* and the dark markings on the head, of similar pattern, are usually heavier. The upper figures on Plate XV illustrate the larva of *ridingsii;* the lower, that of *semicrocea.*

Ridingsii is peculiarly free from parasites. Of several hundred larvæ and pupæ, only two were observed to be parasitized, and these by a tachina fly determined by Prof. C. W. Johnson to be *Hypostena variabilis Coq.* The pupæ have an active enemy in a bird (?) which systematically selects the leaves showing the large emergence hole and splits them down until the cocoon is reached, abstracting the pupa. In one field, perhaps a quarter of the entire brood was so destroyed.

The dates given are probably a little later than those of an average year, as in 1907, throughout April and May, the weather was unusually cool, with heavy frosts to the middle of April.

Exyra semicrocea Gn.

In the vicinity of Summerville, S. C., the dry grass, weeds, and brush in the open pine-woods and adjacent meadows where the pitcher-plants grow, are burnt over each winter, with the idea of improving the pasturage for the cattle, which are allowed to graze in the unfenced woods and fields. This results in the destruction of a very large proportion of the hibernating larvæ of *Exyra ridingsii,* and it is only in such spots as escape the annual burning that these caterpillars make

their appearance in the spring. A full month before the appearance of the moths of this species, however, the moths of *Exyra semicrocea* Gn. suddenly appear in numbers in the leaves of the pitcher plants, both *flava* and *minor*. At this time (the middle of April), many of the *flava* leaves are well developed, but *minor* is much more backward and offers scant accommodation to the moths, which, for about two weeks, are very abundant, sometimes as many as four occupying a single leaf of *flava*. These moths evidently emerge from overwintered pupæ, as the flower-buds and limited number of leaves available up to this time show no trace of larvæ feeding; unlike *ridingsii*, they are even more abundant in the burned-over tracts than in those sections which have escaped the flames, for in the burned portion the new leaves which give shelter to the moths are more numerous. A peculiar habit of the larvæ, it will be seen later, is probably responsible for their ability to survive the fires so destructive to *ridingsii*.

The moths of *semicrocea* and *ridingsii* are extremely averse to leaving their shelters; the leaves may be gathered and carried about almost indefinitely without disturbing them, and at any attempt to dislodge them, they back further down the tube of the leaf and are almost sure to be badly battered and rubbed in the process. This instinct to walk backward when alarmed (they always sit heads up in the leaf), is so persistent that when removed from the leaf and placed upon a flat surface, they are more apt to walk backward than forward.

The spring brood of moths has practically disappeared by May 5th. The pale yellow eggs, placed singly and several inches down from the mouth of the pitcher, were frequently noted in the larger leaves of *flava*, but subsequent observations indicated that practically all of their eggs, or the newly hatched larvæ from them, perished, and that the more suitable food plant of this species is *minor*, preferably the young and immature leaves not yet open at the top, though they also seemed to thrive, though less abundantly, in the tender, unopened leaves of *flava*.

The young larvæ have a very peculiar habit of feeding, which

is evidently of great importance in insuring them safety from parasites and predaceous insects. They cut from one to three, or even four, encircling grooves around the inner surface of the leaf, well up in the swell of the hood, and extending as a tunnel out through the flat stiffening wing of the leaf. This groove is at first so small that it is invisible until the leaf is held to the light, and its effect varies with the age of the leaf. In a tender unopened leaf, in which larvæ are most frequently found, it quickly causes a shrivelling and drying of that portion of the leaf above the groove, so that while the lower portion remains tender and juicy, entirely suitable for the young larva to feed upon, the upper part ceases to grow, and soon forms a hard dry cap to the leaf-tube which is thus effectually closed to possible intruders. (Plate XVI, first figure, healthy leaf; second and third figures, leaves grooved by larvæ.) On older leaves, however, the groove seems to have little effect, and in these the larvæ feed until large enough to undertake the ceiling of the open top with a web of silk. This web is usually spun from the angle of the lips of the pitcher in front, curving upward into the arch of the hood; but the habit is varied, and the web is occasionally spun directly across the tube at the highest possible point, just below the lips, like *ridingsii* in *flava;* and in a few instances a double web, one from either side of the hood and meeting at the angle of the lips in front, was noted (see Plate XVI, three figures). The spinning of the web occupies only about thirty minutes. A single leaf usually carries the larva to the last or next to the last larval moult; on changing to a new leaf it spins the ceiling web in one of the three ways described, and sometimes also cuts an encircling groove which is usually obliterated by feeding before it has any effect on the leaf. Feeding from the top downward, the lower portion of the tube becomes filled with frass, on approaching which the larva reverses its position and feeds upward, sometimes even forcing its way down in the frass-filled tube, that no available portion of the leaf may be left unconsumed.

The larva of *semicrocea* is readily distinguishable from that of *ridingsii* by the difference noted under that species.

A search for pupæ in the leaves showing the effects of larval feeding was entirely unsuccessful, and very few were found in the large number of winter leaves examined; it was not until a number of larvæ had been kept in captivity that the reason for this became apparent. In every case, these larvæ, when ready to spin, left the leaves in which they had been feeding and hurried about their cage for half an hour or more, before finding a place to their liking. This was usually a new and unfed-upon leaf, which they ceiled lightly with silk, well down in the tube, spinning a flimsy, almost transparent cocoon just below this web (Plate XVI, last figure). With this hint as to their habit, search in the field for pupæ was more successful. When a leaf containing no larva, but showing evidence of continued feeding, was found, the cocoon could frequently be located in an adjacent leaf showing no trace of feeding; but isolated plants showing undoubted evidence of having furnished food to one or more larvæ, often contained no cocoons in any of their leaves, indicating that the larvæ, in their wanderings, must frequently fail to find suitable leaves, and presumably spin their cocoon in the moss and stubble which surround the growing plants. The instinct to desert the leaf in which it has fed, and to spin its cocoon where no trace of feeding will give a clue to its presence, no doubt, in a measure protects this insect from the enemy so fatal to the pupæ of *ridingsii*, though many of the larger leaves of *minor* are split open, evidently by the same bird which reaps such a harvest in the *flava* leaves. This instinct also probably aids it to escape destruction by the fires so fatal to the larvæ of *ridingsii*, otherwise the abundance of *semicrocea* in tracts very thoroughly burned over, where no *ridingsii* larvæ survive, can scarcely be understood.

The first pupæ of the spring brood were noted May 19th, at which time many very young larvæ were still in the leaves. The pupal period varied from fifteen to eighteen days, but may have been extended by removal to a colder climate. The earliest emergence was recorded June 1st, and the latest from this brood, not until July 11th, so that undoubtedly the later broods overlap more or less with those of *ridingsii*. The

pupa varies in color from pale amber to almost black. The moths are not so variable as those of *ridingsii;* the yellow area is seldom much clouded with dark scales, though varying considerably in extent, and the dark markings are usually well indicated, though showing considerable variation in intensity.

C. V. Riley has figured this insect in all its stages (Can. Ent. VII, 207 and elsewhere). His account of the larval habits is evidently based on observation of a later brood in mature leaves; and the cocoon-spinning habit, as described by him, agrees more nearly with that of *ridingsii* than with *semicrocea,* as the two species were observed together at Summerville, S. C.

Thecla calanus and Thecla edwardsii.*

By Henry H. Lyman, M. A., Montreal.

In the first annual address, which, as President of the Entomological Society of Ontario, I had the honor of delivering in 1898, I ventured to say to the "lumpers" that "once a form has been described as a new species it should not be lumped, except upon overwhelming proof." To this doctrine the able editor of Entomological News gave his adhesion in 1899,† but seems to have withdrawn from this position in his article on the above named species in Entomological News of February, as his "proof" of the identity of these forms is anything but overwhelming.

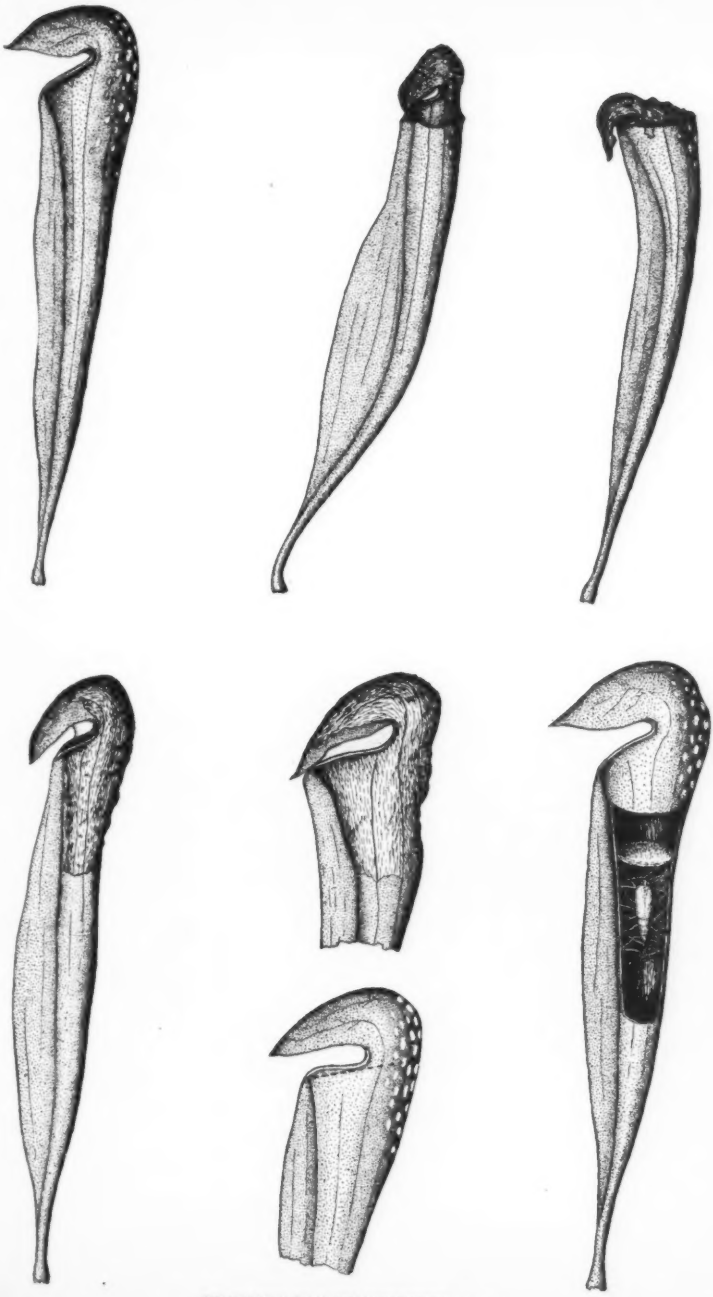
These unfortunate little butterflies have been more hardly treated by the authorities than any other of their genus on this continent, as anyone may see by a very slight examination of the literature of the subject.

Dr. Skinner changes the spelling of the second name to *edwardsi,* and though I am not one of those who would cling to an original spelling where obviously wrong, I think that the original form, when not wrong, should be adhered to.

This species has universally been credited to Dr. Saunders, which seems rather strange as no description was ever published by him, and on the appearance of the description by

* Read before Ent. Soc. Ont., at Guelph, July 4, 1907.

† Can. Ent., xxxi, 196.



PITCHER-PLANT INSECTS—JONES

Grote and Robinson of *Thecla lorata,* and their supposed identification of *edwardsii* with *Thecla calanus,* Westwood,* he withdrew his proposed name, and said that *calanus,* West., must be substituted. †

But the man who did the most to unravel the tangle in connection with these species, although at first he had confused them, not only with each other, but even with *Thecla acadica,* was Dr. Scudder, who illustrated them beautifully in his sumptuous work on the Butterflies of New England, and gave the fullest references to the literature, and it was he who suggested the retention of the name originally proposed in correspondence by Dr. Saunders.‡

Dr. Saunders' original description was read before the London Branch of the Entomological Society of Ontario, and was possibly communicated to both Mr. W. H. Edwards and Dr. Scudder, but as it was never published it cannot be referred to, but there can be little doubt as to the correctness of its reference by Dr. Scudder to the form with which it has ever since been associated, although Dr. Saunders himself identified it with *T. calanus,* West.

Why *calanus* was credited to Westwood by Grote and Robinson, I fail to understand, unless it may have been on the supposition that he was the author of the generic combination, which vicious practice Grote formerly followed, but if so, they must have overlooked the use of the name in Doubleday's List of the Lepidoptera of the British Museum, which I have not had access to. The reference to Westwood was probably based on its mention in the list of Theclas in the second volume of the Genera of Diurnal Lepidoptera popularly credited to Doubleday, Hewitson & Westwood, of which the first volume was by Doubleday; the second by Westwood, and the plates only by Hewitson, but in that work it is correctly credited to Hübner.

In looking up the references, I have discovered several curious errors.

The original reference is to Hübner's Samm. Ex. Schmett.,

* Trans. Amer. Ent. Soc., i, 171-173.
† Can. Ent., i, 99.
Proc. Bost. Soc. Nat. Hist., xiii, 274.

but most authors merely specify Vol I; none give the number of the plate, probably because in the original edition the plates were not numbered, but in Wytsman's re-publication they are, and this plate is No. 100. No description was given by Hübner, but his figures are unmistakable as to the underside.

At the time Messrs. Grote and Robinson described their *Thecla lorata* and *Thecla inorata*, they were of the opinion that the species, since known as *edwardsii* Saund., was the same as *calanus*, Hübn., and stated* that they had seen Godart's type of *T. falacer* in Dr. Boisduval's collection, and that it was a specimen of *calanus*. If they were correct in their identification, and if the specimen they saw was really the type of *falacer*, it would mean, as pointed out by Mr. Grote,† that the name *T. falacer*, Godt. would have to replace *T. edwardsii*, Saund., but from the descriptions given by Godart,‡ which I here transcribe, I am inclined to think that the species described was the true *calanus* as we know it:

"No. 58 Polyommate Falacer.

"Ailes d'un brun-noiratre: leur dessous avec deux traits discóidaux et deux lignes postérieures ondulées d'un bleu-pale; celui des inferieures ayant à l'angle interne trois lunules rosses."

Further on in the work (page 633), there is the following fuller description:

"No. 58 Polyommate Falacer.

"*Pol. alis fuscis: subtùs lineola gemina disci strigisque duabus apicis undulatus coerulescentibus; posticis lunulistribus anguli ani rufis.*

"Il a un peu plus d'un pouce d'envergure. Le dessus des ailes est d'un brun-noiratre sans tache dans la femelle, avec une tache blanchatre cotonneuse vers le milieu des ailes superieures du male. Le dessous est à peu près de la couleur du dessus, avec un double trait central, puis deux lignes transverse et ondulées, d'un bleu-pale et bordés de brun-foncé sur un de leur côtés. Les secondes ailes ont en outre près de l'angle de l'anus trois chevrons roux, dont l'interieur separé des deux autres par un large groupe d'atomes bleuatre. Des environs de Philadelphia, Amerique Septentrionale."

If, however, Godart's type can be certainly identified, it should be possible to settle the point beyond doubt.

* Trans. Amer. Ent. Soc., i, 324.

† Can. Ent., ii, 166.

‡ God. Encycl. Meth., ix, 600.

The plate, No. 29, illustrating *Thecla falacer*, in Boisduval and Leconte's work, is quite correctly referred to as representing *T. calanus*, Hübn., but I do not see that it has been by any means satisfactorily established by Mr. Grote, as stated by Dr. Saunders * that the description in the text was drawn up from *T. edwardsii*.

In Proc. Bost. Soc. Nat. Hist. XIII, 272-276 (1870), Dr. Scudder published an exhaustive paper on the synonymy of *Thecla calanus*, correcting the misidentifications of Grote and Robinson, but ignoring the form *lorata* which has been recognized by other authors as a variety of *calanus*. This reference of *falacer*, Godt., as a synonym of *calanus*, Hübn., may be, as above shown, open to question, but his statement that all the specimens in the Harris collection are *edwardsii* is not quite correct, if that collection is in the same condition now as when he examined it. I recently had an opportunity of examining it, and found that there were three specimens of *edwardsii* ♀ all bearing a printed number 76, and with manuscript numbers 160, 405, 405, which referred to Harris' list of specimens in which they were entered as *falacer*.

There was, however, in addition, one specimen of *calanus* ♂ which bore a printed number 75, but no manuscript number, but there was a label put on in error by some one, which bears the words, "Notodonta, July 20 45." It may, however, be safely accepted that *edwardsii* was the species which Harris called *falacer*, although in his description, † he says that the rows of spots on the under side are bordered on one side only with white.

In his references, he duplicates those to the papers by G. & R., giving the names of the papers and the page numbers of the author's separates, as well as the pages in the Trans. Amer. Ent. Soc.

Grote disagreed with Scudder's conclusions, and wrote a paper from Demopolis, Ala., which was published in Can. Ent. II, 165-168, in which he claimed that what Scudder called *edwardsii* was really *falacer*, Godt., and that *calanus*, Hübn.

* Can. Ent., i, 99.
† Insects Mass., 276.

was probably the same, or possibly a mixture of both forms, and that, therefore, *T. inorata*, G. & R., was correctly described. He, however, made several errors in his references, giving the reference to his author's separate instead of to the "Transactions" for *T. inorata*, and giving on the last line of that species a reference to the "Transactions" where *T. lorata* was described, and in which there was no reference to *T. inorata*. In connection with this paper a very curious error was afterwards made by him, as in Can. Ent. XIX, 179, he refers to the above paper as "printed at Demopolis, Ala.," and "now out of print, but is in several libraries, and was generally distributed." Evidently he had before him an author's separate, and had quite forgotten that it was only written from Demopolis and printed in the Canadian Entomologist.

Scudder's reference under *calanus*, to Fernald's Butterflies of Maine, is erroneous as to pages, which should be 78-79 instead of 80-81.

Evidently these distinguished authors did not sufficiently heed the advice of the late Dr. Martin John Routh, the learned president of Magdalene College, Oxford, "Always verify your quotations." So much for the literature of the subject; let us now turn to the butterflies themselves.

Dr. Skinner began by separating his specimens by color, and then concluded that they all belonged to one species.

On that method of procedure, no other result could be expected, for while it is quite true that in perfectly fresh specimens *calanus* is darker than *edwardsii*, this difference is soon lost in flight, and I have a specimen of true *calanus* which is lighter than any specimen of *edwardsii* in my collection.

What might be called the key to these species is found in the extra mesial band of the under surface, in *calanus* the spots forming a band, as indicated by Scudder's English name, "The banded hair streak," while in *edwardsii* they are distinct, though by no means equally so in all specimens. As butterflies are not stamped by a die like coins, they necessarily vary, and in two such closely allied species as these we must naturally expect to find some of the variations running very close to each other, but I have never found a specimen which I could not place.

There are other differences mentioned by Scudder. In *calanus* the discal stigma of the male is oval, nearly twice as long as broad, while in *edwardsii* it is narrow and three times as long as broad. According to Scudder's illustrations, the scales of the discal stigmas differ slightly in form, those of *calanus* being slightly broader in form and differently shaped at the base, where they are rounded, while in *edwardsii* they are angulated at the base and the sides straighter and less tapering. According to Scudder's figures, the abdominal appendages of the males also differ distinctly, but I have never made a study of these parts. There is one point, however, which I consider of very great importance, and that is, the occurrence of *calanus* where *edwardsii* is not found. Were they merely forms of one species, they should fly together, and while they, no doubt, do in some localities, in others they do not. In Montreal *calanus* occurs in fair abundance on the blossoms of the common milkweed (*Asclepias cornuti*, Decaisne), being, in fact, the only *Thecla* we have which is at all common, but *edwardsii* has never been taken at Montreal, so far as I am aware, while I have taken it abundantly in High Park, Toronto, on the blossoms of New Jersey tea (*Ceanothus americanus*, L.).

I have never bred *edwardsii*, but found a larva of *calanus* on the red oak (*Quercus rubra*, L.), and reared it to the imago.

Until, therefore, far more weighty arguments are brought forward than any of those adduced by Dr. Skinner, I shall hold these forms separate in my collection as distinct species.

RARE HEMIPTERA IN VIRGINIA.—During the past season I have taken several rare species near Falls Church. *Isometopus*, which I had not seen for four or five years, was found in two localities on the bark of black oak trees July 27, August 2. It was the unmarked species; both of our species of this genus are undescribed. *Heidemannia cixiiformis*, which belongs to the same family as *Isometopus* I found once on a small black oak tree July 20. While looking on tulip trees for Psocidae I found adults and cast nymphal skins of a *Tingis*, *T. uniformis*. It was in the early part of August, and none were found on other trees. On the foliage of tulip trees I found an interesting capsid—*Eucerocoris guttulatus*—quite abundantly in August. They are difficult to recognize at rest, and when disturbed are very active and difficult of capture.—N. BANKS.

Insect Bionomics.

By Vernon L. Kellogg.

(A paper read before the section of Entomology at the Seventh International Zoological Congress, Boston, August 19-23, 1907.)

Insect bionomics is a title that may not meet with the approval of some. They would say insect ethology, or ecology, or biology, or natural history. But whichever of these titles we use, we all recognize, under the name, a common point of view and common subject of study. The particular point of view is that of the inquirer after the relation of insects to other organisms and to their physical environment, and of the inquirer after the laws that govern the variation, inheritance, distribution, adaptation, and species-forming of insects. The student of insect bionomics is the student of evolution, using insects as study material. The study of insects, less for the sake of a knowledge of insects than for a knowledge of the laws of life, is the interest and endeavor of a growing number of entomologists.

A European zoologist, to whom I was introduced in Naples, said, with kindly condescension, "Ah, yes, I know, an American entomologist who knows something of biology." The intended kindliness of this remark was all that prevented me from expressing my own hopelessness of meeting a general biologist who troubled himself to know much about insects. A constantly growing acquaintanceship with American and European zoologists keeps me continually surprised at the extraordinary lack of appreciation of the possibilities and advantages of a serious attention to insects on the part of general biologists and students of evolution. But also I must add that my acquaintanceship with professed entomologists compels me to recognize that we ourselves need rousing to the great opportunity in our hands of forwarding scientific knowledge touching the focal biologic problem: namely, the problem of the origin and method of species-change and evolutionary descent.

In the study of insect biology we have to do with an enormous number of related animal kinds very consistent in their essential animal structure and physiology, but extremely plastic

as regards superficial modification and adaptation, these kinds occurring in closely massed great series of individuals, easily observed in nature, readily obtainable as laboratory and museum material, conveniently and economically reared and experimented with, well known systematically and morphologically, and so abundant, widespread and adaptive that they have carried to an extreme almost all types of ecologic shifts for a living. They truly offer themselves as the most accessible of all animal material that the student of evolution problems can work with, and yet they compose that animal group relatively, if not absolutely, least taken advantage of for this purpose.

The number of known insect kinds is, roughly, about 350,000; more by far than the total of all kinds in all the other animal classes taken together. This very weight of existent species, coupled as it is with an equally extraordinary high numerical representation of individuals brings about a life pressure which has resulted in the high development of a great variety of adaptation; adaptation in food-getting, in means of defense and offense, in egg-laying and care of young, in nest-building, in a score of other phases of specialized life. This adaptation or modification, both structural and functional, in its turn leads swiftly and variously to species-change—that is, to species-forming. And adaptation and species-forming are the two fundamental and co-equal problems of evolution today.

But there are various outworks of the grand problems to be attacked, one or a few at a time. There are various avenues or lines of approach to the problems. Such lines or phases of the general study of evolution are denoted under the various titles of variation, heredity, isolation and distribution, parasitism, commensalism and symbiosis, color and pattern, regulation and regeneration, and others.

It is my wish to refer simply, and almost in cataloging manner, in the few minutes at my disposal, to some of the contributions already made from insect biology to the study of these evolution problems, and to point out further work and opportunity that lies ready to our hands.

In variation studies the opportunity afforded by the insects

is extraordinarily favorable. The precisely determinable character of differences in color, in pattern, in venation details, in numbers of spurs, spines and hooks, in linear dimensions, etc., coupled with the ease of collecting long series of individuals bred in identical or determinably different conditions of climate, locality, season, altitude, etc., make insects very available material for studies in variability. Such intensive studies as those of Miss Enteman on *Polistes* and Tower on *Leptinotarsa* well illustrate the possibilities and the value of insects to students of variation.

In experimental studies in heredity the availability of insects as *Versuchs-object* is marked. The rapidity and the prolificness of reproduction enable a student to get data from hosts of individuals in a single year. Miss McCracken gets six and seven generations of *Lina* and *Gastroidea* each season in her elaborate investigation of the behavior of inheritance in these dichromatic and sporting species. She breeds and examines carefully and obtains quantitative data from 50,000 pedigreed individuals a year as a basis for generalizations. Compare this with the laboriously and expensively derived data from the birds and mammals so commonly used in experimental studies in heredity. Using silkworms, representing a dozen races, most of them well distinguished and stable, I have been able to get inheritance data representing from ten to thirty thousand individuals a year.

In the field of distribution and isolation studies, much may be done now and much more as our faunistic knowledge of insects increases. But intensive studies, like Shelford's with the tiger-beetles, show how pertinent are the data to be derived from such studies.

It is, of course, familiar knowledge that the development of the various theories connected with the relation of color and pattern to surroundings, viz., the theories of protective and aggressive resemblance, of warning colors, of directive coloration, of alluring and recognition marks, and of mimicry, has been almost wholly based on studies of insects. Bates, Belt, Müller, Poulton and Marshall have built up their interesting theories almost wholly from conditions found in the insect

world. Particularly needed in this field is experimental work such as that so admirably exemplified by Marshall in South Africa.

In the fascinating field of the parasitic, commensal and communal relations of animals it is again familiar to us all how dominant are the results derived from the studies of insect life. The splendid work of Wheeler alone is revelation and inspiration enough to make every entomologist an ardent student of this phase of animal bionomics.

Nor do the insects fail to offer themselves as inviting material for such phases of study as regeneration, regulation, etc., more familiarly associated with animals less completely organized. Oudemans, Verson, Brindley and others have contributed valuable data to the knowledge of regenerative and regulatory processes from their work on *Bombyx, Porthetria,* Blattidæ, etc.

In studies of the generative phases of life, insects have contributed profitable data, and can be made to give much more. The classic observations of Siebold on natural parthenogenesis in the aphids and the pioneer work of Tichomiroff on the artificial parthenogenesis of silkworm eggs are examples.

In the now immensely worked realm of animal behavior and psychology the insects can be sought to great value. Highly organized and specialized as they are, clever work can still manage to analyze much of the complexness of their behavior into simple terms. Loeb's epoch-making paper on heliotropism among animals was based largely on experiments with caterpillars.

I might go on, only to become tiresome, and refer to other achievements and opportunities of special students of insects. The whole point is this: The insects are unusually available and valuable material for evolution studies; they are not being used nearly as much as they ought for such studies, although when so used they have presented most valuable data. Therefore, it should be our duty as entomologists both to encourage general biologists to give more attention to insects, and to give ourselves more attention to the general biology phase of insect study.

On the Phorid Genera Plastophora and Pseudacteon.

By Charles T. Brues.

In a recent paper published in the Canadian Entomologist* Mr. D. W. Coquillett describes a remarkable new species of Phoridae parasitic on ants. He has erected a new genus for its reception, naming the species *Pseudacteon crawfordii*. It was discovered in Texas ovipositing on the heads of the ant, *Solenopsis geminata*, after the manner of the related *Apocephalus pergandei* Coq., which is a parasite of various species of *Camponotus* in this country.

In examining Mr. Coquillett's description and figures I was struck by the similarity between *Pseudacteon* and the genus *Plastophora* Brues,† and have recently obtained through the kindness of W. D. Pierce two paratypes of *Pseudacteon* for comparison.

I find that the two genera are extremely similar and not separable by any characters which I consider to be of generic value. The only differences which I have been able to detect are the more slender legs, less prominent mouthparts, and larger pyriform antennae of *Pseudacteon*. Differences of the same magnitude occur in other genera, for instance in *Aphiochaeta* and *Hypocera* where they cannot be utilized for generic separation on account of the species which occur with intermediate characters. In the Genera Insectorum (Fascicle 44, Fam. Phoridae, p. 11, 1906) I have placed Verrall's *Phora formicarum* in *Plastophora* with some doubt, but now feel assured that it properly belongs here as it seems more closely related to *P crawfordii* than to the type of the genus. The genus therefore should now contain the following three species:

P. beirne Brues, Ann. Mus. Nat. Hung. iii, p. 551 (1905), New Guinea (type of genus).

P. formicarum Verrall, Journ. Linn. Soc. Zool. xiii, p. 258 (1877) England.

P. crawfordii Coq., Can. Ent. xxxix, p. 208 (1907), Texas.

This note is presented at the present time in order that the change may be incorporated in the generic tables of Phoridae for Professor Williston's forthcoming manual.

*June, 1907, p. 207. A New Phorid Genus with Horny Ovipositor.

†Ann. Mus. Nat. Hung., III, p. 551 (1905).

An undescribed Dimorph of the Box Elder Aphid Chaitophorus negundinis.

By L. C. Bragg, Colorado Agricultural College.

(Plate XVII.)

The alate and apterous forms of the above Aphid were described by Professor Cyrus Thomas, in 1878, in Illinois.

On June 19th, 1905, the writer found the dimorph in Fort Collins, Colorado, on the upper veins of the leaves of the box elder, *Rolac negundo*. This form was so exceptional with the twenty-two leaf-like flabellæ arranged on the margin of the abdomen that the resemblance to the European species, *Ch. aceris*, which has fourteen, was very striking.

This form was kept under observation during the summer, and the facts demonstrated that it does not moult and does not reproduce. Many empty skins were found where the aphid had been sucked dry by some predacious insect, but none showed the characteristic split on the back that one finds in all moulted skins.

In 1906, I began early to look for the dimorph, but did not find it until June 4th. They did not become plentiful until the middle of the month, and I could not determine whether they were the progeny of the alate or of the apterous form. On June 16th, I began dissecting the mature insects, and soon learned that both the apterous and alate forms gave birth to the dimorph. Not only this, the dimorph was associated with the normal young in the same mother in several instances. Of one hundred specimens dissected, there were nineteen alate females and eighty one apterous females. Of the nineteen alate specimens, fourteen had dimorphic embryos only, while five had the normal forms only. Of the eighty-one apterous females, thirty-nine contained dimorphic embryos, and forty the normal form. These results would indicate that the dimorphic form is produced in as great numbers as the normal form in this generation. The leaves of the host plant would also indicate this, for they sometimes crowd each other on the veining of the upper side of the leaf. The normal form sucks the under side of the leaf and the tender stems. It would

seem that the dimorph, from its diminutive size, is unharmed, as parasites and predacious insects rarely trouble it, and for weeks it remains on the leaf where it first settled. It taps the vascular system of the plant where its food is most abundant. Abundance of food, however, does not tend to enlarge this form, for it is never larger than when a few minutes old.

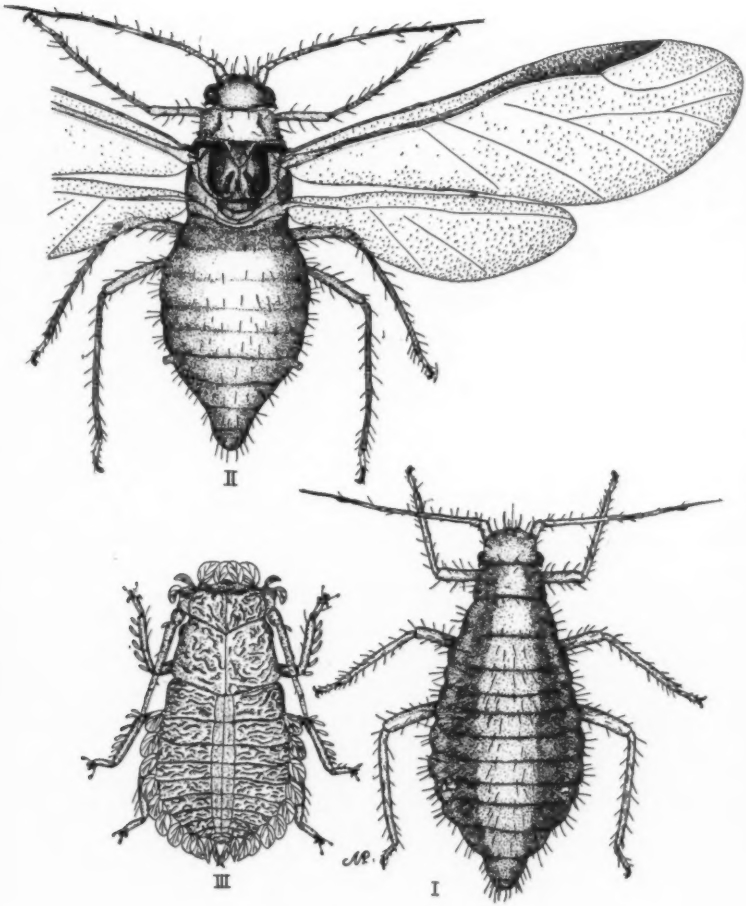
Last fall the apterous sexual forms were kept under observation, and by marking trees where the oviparous females had deposited eggs, I felt quite sure that the following spring I should be able to take the stem mothers when the eggs hatched. I took branches containing eggs into the laboratory of the Agricultural College as soon as the buds began to swell, but those did not hatch, and Professor Gilette was fortunate enough to find young on the trees on February 23d. Some of these may have been hatched for a week or more. On March 10th, these stem mothers began reproducing. One of these was separated on the 13th, and on the 25th had given birth to one hundred and seventeen young. I accidentally killed her at this time, so cannot say how many she might have produced. Another died after producing one hundred and fifty-four. All of the first two generations are apterous. The third generation produces both alate and apterous forms. The dimorph does not appear until the fourth generation.

Why this form should appear in the fourth generation, or in any other, is a mystery. I know of no other animal that gives birth to young that are apparently useless to the species. It would seem to be a case of the survival of the unfit, as it neither reproduces nor aids the species in any way.

The cuts have been made from drawings by the station artist, Miss M. A. Palmer. Fig. I represents an apterous female of second generation; Fig. II, an alate female of the third generation; Fig. III, a dimorph which is of the fourth generation.

(Explanation of Plate XVII.)

Chaitophorus negundinis:—I, Apterous female belonging to second generation, X 25 diameters; II, Alate female belonging to third generation, X 25 diameters; III, Dimorph belonging to fourth generation, X 61 diameters. (Miriam A. Palmer, artist.)



CHAITOPHORUS NEGUNDINIS—BRAGG.

On some Heteropterous Hemiptera from N. Carolina.

By J. R. de la Torre Bueno and C. S. Brimley.

This preliminary list of Heteroptera is based on collections made by C. S. Brimley, principally in the vicinity of Raleigh, with an occasional trip to Lake Ellis in Craven County, where the very interesting Naucorid noted later on appears to be abundant.

The classification employed is that of Schiodte* as modified by Kirkaldy, † which may be regarded as the best expression of the relationship of the families thus far propounded.

The only synonymies given are such as serve to bring out the difference between this and the older classification.

It will be noted that certain of the families are not represented, while others not heretofore recorded from the United States make their appearance.

All the biological data are by the junior author.

Division A.—PAGIOPODA Schiodte.

Family CLINOCORIDÆ Kirkaldy (= CIMICIDÆ Leth. and Serv.)

Genus **CLINOCORIS** Fallén (= *Cimex* Auctt. =*Acanthia* Auctt.).

C. lectularius Linne. Not uncommon, although not represented in the collections.

Family OCHTERIDAE Kirkaldy (=PELOGONIDAE Auctt.).

Genus **OCHTERUS** Latreille (= *Pelogonus* Auctt.).

O. americanus Uhler. Raleigh, N. C., March 25, 1905. One specimen found under a stone near the edge of a stream.

Family NERTHRIDAE Kirkaldy (=GALGULIDAE Auctt. = GELASTOCORIDAE Kirkaldy).

Subfam. Gelastocorinae Kirkaldy (= Galgulinae Auctt.).

Genus **GELASTOCORIS** Kirkaldy (= *Galgulus* Auctt.).

G. oculatus Fabr. Raleigh, April 7, 1904, March 21, 24 and 25, 1905, March 31, 1906, April 7, 13, 1906, May 29, 1906, June 11, 12, 1906, July 17, 1903, August 23, 1903, August 8, 1906, October 5, 1906, October 16, 1905.

Apparently the commonest form near Raleigh. The specimens before us are very well marked and cannot be mistaken

* Ann. and Mag. N. H., ser. 4, vol. vi, Sept., 1870.

† Trans. Am Ent. Soc. xxxii, No. 2, 1906.

for any other species. In connection with this it may not be amiss to state that the commonly accepted statement that this is the only form to be found in the United States is erroneous. The senior author has in his collection at least five species from the Atlantic seaboard, and two or three more from the Pacific coast, all but one of which are undescribed.

G. sp. Lake Ellis, May 8-18, 1906. Some two or three taken.

This is a form very distinct from *oculatus* Fab., approaching the Central American species. It differs from the common *oculatus* in size, shape, markings, although it must be said that color in the genus is absolutely negligible. This form also occurs in New Jersey.

Family NAUCORIDAE Stal.

Subfamily NAUCORINAE Kirkaldy.

Genus **PELOCORIS** Stal.

P. carolinensis Bueno. Lake Ellis, June 8-14, 1905, May 18, 1906. Abundant.

This interesting little form is very distinct from our common *P. femoratus* Pal. de Beauv., and approaches near the smaller and more slender tropical American species.

Family BELOSTOMATIDAE Auctt.

Genus **BENACUS** Stal.

B. griseus Say. Raleigh, March, 1903, at electric light; also taken in 1905, March 10 (23), May 6 (6); in 1901, September 20 (41), 21 (37), November 18 (1); in 1902, April 1 (38), 2 (54), 3 (1), 5 (3), 7 (1), 12 (5), 14 (9); in 1903, March 10 (80), 11 (58), 12 (29); in 1904, March 26 (32); in 1905, January 13 (1), June 21 (1); in 1906, April 11 (118), 12 (80), 13 (46), 14 (35); the spring flight in March or April seems the largest, though there are several others during the year.

Genus **AMORGIUS** Stal (= *Belostoma* Auctt. nec Latreille).

Subgenus **Montandonista** Kirkaldy.

A. uhleri Montandon. Raleigh, July 4, 1904, at electric light; also taken May 6, 1905 (8), and in 1906, April 14 (1), June 15 (2), 21 (1).

Not uncommon at times in summer around electric lights, but never as abundant as *B. griseus*, nor does it fly so early in the season.

Genus **BELOSTOMA** Latreille (= *Zaitha* Auctt.).

B. aurantiacum Leidy (=*lutaria* Stal). Raleigh, April, 1900; May 25, 1905.

This species appears to take the place in the southern States of our common northern *B. flumineum* Say.

B. flumineum Say. Raleigh, April 16, 1906.

One specimen only of this species which appears to be only of rare occurrence around Raleigh. Another specimen was taken in the spring of 1905.

B. testaceum Leidy (=*Zaitha reticulatum* Haldeman). Raleigh, April 1900; in 1906, April 12, June 11 (1), August 8, (4), 9 (2).

A far from uncommon species which also occurs sparingly in the north.

Family CORIXIDAE.

A number of species in the genus *Corixa* have been taken from time to time, but in the present chaotic condition of the American species of the genus it has been thought best not to attempt to list them.

Family NOTONECTIDAE Leach.

Subfamily NOTONECTINAE Kirkaldy.

Genus **NOTONECTA** Linné.

N. undulata Say. Raleigh, November 9, 24, 1904.

The usual forms in this species, which is not at all common. This species has been taken only in the pool in Green's rock quarry where it is usually abundant, except on November 23, 1905, when some were taken in a pool in Walnut Creek low-grounds. Mr. Sherman also took it at Warsaw, Duplin Co., North Carolina, May 19, 1905.

N. irrorata Uhler. Raleigh, 1905, March 21, 29, October 16, November 13, April 7, June 11, 4 newly transformed specimens, August 8. Taken by Mr. Sherman at Warsaw, May 19, 1905.

N. variabilis Fieber. Lake Ellis, May 14, 1906.

Three specimens which are placed here provisionally. They are slimmer than the usual run, but in the absence of a minute scrutiny no good characters have been found.

N. raleighi Bueno. Raleigh, October 17, November 25, 1904; in 1905, March 9, 17, April 15, August 5, October 16, November 23 and February 26, 1906.

This very interesting little species is represented by good series. It is easily separated from *N. variablis*, its nearest relative, by the smaller size, blackish fasciae and notocephalic structure. Apparently more widely and uniformly distributed than any other species found here.

N. uhleri Kirkaldy. Raleigh, March 1, 9, 25, 29, 30, April 15, October 16, 1905, and April 22, 1906.

This rare form has been taken on several occasions, about 20 having been taken altogether. More widely distributed in this neighborhood than any other species, except *raleighi*, with which it is usually associated.

Genus **BUENOA** Kirkaldy (**Anisops** Auctt., partim.).

B. albida (?) Champion. Raleigh, October 27, November 9, 24, 1904, October 16, 1905, and August 8, 1906.

This species is very common and is the form commonly listed as *platycnemis* Fieber, although it does not at all agree with the original description. Although it is tentatively identified as Champion's species, it may after study prove to be undescribed.

Division B.—TROCHALOPODA Schiodte.

Family REDUVIIDAE.

Genus **PYGOLAMPIS** Germar.

P. sericeus Stal. Raleigh, May 5, 1904.

Genus **SCHUMANNA** Champion.

S. mexicana Champ. Raleigh. Taken in June by Mr. F. Sherman.

This is a most interesting record, as the only other appears to be the Mexican locality of the type specimen.

Genus **STENOPODA** Laporte de Castelnau.

S. culiciformis Fabr. Raleigh, September 14, 1905, and May 31, 1906.

Genus **REDUVIUS** Lamarck.

R. personatus Linnè. Raleigh. Taken by Mr. Sherman in July.

Genus **CONORRHINUS** Laporte de Castelnau.

C. sanguisugus Lec. Has been taken about Raleigh in June, July and and August, but is not uncommon.

Genus **MELANOLESTES** Stal.

M. abdominalis H. S. Raleigh, June 22 and October 31, 1904.

This species is not uncommon under stones, taken in winter.

M. picipes H. S. Raleigh.

Common under dead bark of standing pines, but not as a rule, unless the space under the bark is rather damp. This species has been taken from October to December and in January, March and April.

Genus **RASAHUS** Amyot et Serville.

R. biguttatus Say. Raleigh. Taken in July by Mr. Sherman.

Genus **SIRTHENEA** Spinola.

S. carinata Fabr. Lake Ellis, May 14, and Raleigh, Sept. 14, 1906.

Genus **ECHTRICHODIA** Lep. et Serville.

E. cruciata Say. Raleigh. October to January.

Found under prostrate logs in winter, but not uncommonly.

Genus **HAMMATOCERUS** Burmeister.

H. purcis Drury. Raleigh.

Taken in November, December, January and August. Not uncommon under bark of dead pines in winter; both nymphs and adults are then found but the latter more abundantly.

Genus **APIOMERUS** Hahn.

A. crassipes Fabr. Raleigh, June 24, 1904; a nymph on April 3, 1905.

Genus **ZELUS** Fabricius.

Z. luridus Stal. Raleigh, August 25, 1904; July 18, August 8, 1906.

Genus **MILYAS** Stal.

M. cinctus Fabr. Raleigh.

This form has been taken as adult in April, August, September, October and December; the nymphs in June and July. This is quite a common species.

Genus **ACHOLLA** Stal.

A. multispinosa De Geer.

Raleigh, September. This is another of Mr. Sherman's captures.

Genus **SINEA** Amyot et Serville.

S. diadema Fabr. Raleigh. Has been taken in May, June, July, Aug., Sept., Oct., Nov., and is common.

Family GERRIDAE.

Subfamily VELIINAE.

Genus **VELIA** Latreille.

V. stagnalis Burm. Raleigh, August 5, 1905.

One specimen only of this interesting species.

Genus **RHAGOVELIA** Mayr.

R. obesa Uhler. Raleigh, May 20, 1905.

Quite a series of this species was caught on that day, all unwinged. Also taken on June 5, 1906.

Genus **MICROVELIA** Westwood.

M. americanum Uhler. Raleigh, April 11, March 16, 1906.

Genus **MESOVELIA** Mulsant and Rey.

M. mulsanti White. Lake Ellis, May 14, 1906.

Subfamily GERRINAE.

Genus **GERRIS** Fabr.

G. conformis Uhler. Raleigh, May 5, 1904, May 2, 1905, also taken April 11, 1906, April 15, 1905, August 5, 1905, and at Lillington, June 8, 1906.

An ample series of this species has been secured. It appears to replace our northern *G. remigis* in the south.

G. marginatus Say. Raleigh, March 25, May 18, 1905, April 31, 1906. Lake Ellis.

G. canaliculatus Say. Raleigh, March 24, 25, May 18, October 16, 1905, October 31, 1904.

Genus **TREPOBATES** Uhler.

T. pictus H. S. Raleigh, August 5, 1905.

Genus **RHEUMATOBATES** Bergroth.

R. rileyi Bergr. One at Milburnie on Neuse River, some five miles from Raleigh, August 5, 1905.

Subfamily HYDROMETRINAE.

Genus **HYDROMETRA** Latreille.

H. martini Kirkaldy (= *lineata* Say). Raleigh, August 5, 1905, Lake Ellis, May 13, 1906.

Family NEPIDAE.

Genus **RANATRA** Fabr.

R. fusca Palisot de Beauvois. Raleigh, May 1, 1905, also a long series in 1900, or thereabouts.

This series was taken in a pool in woods alongside of the creek, and it had a great many dead leaves in it, among which were numbers of *R. fusca*. Since then there has been taken only the other specimens mentioned above, and one each on April 1, 1905, November 15, 1905, and November 11, 1904.

R. kirkaldyi Bueno. Raleigh, March 27 (1), 29 (1), 1905; February 26 (2), April 12 (2), 1906, also one in late December, 1904.

Family MACROCEPHALIDAE (=PHYMATIDAE Olim).

Genus **PHYMATA** Latreille,

P. fasciata Gray (=*wolfii* Stal et Auctt.). Raleigh, May 2, 1905, and in May, June, August and September.

Family ARADIDAE.

Genus **ARADUS** Fabr.

A. acutus Say. Raleigh, November 17, 1905, Southern Pines, March 26, 1906.

A. cinnamomeus Panzer. Southern Pines, March 26, 1905. Two winged specimens.

A. inornatus Uhler. Raleigh, February 17, 1906.

Genus **MEZIRA** Amyot et Serville (=**Brachyrhynchus** Lap. de Castlenau).

M. granulatus Say. Raleigh, November 17, 1905.

Genus **NEUROCTENUS** Fieb.

N. simplex Uhler. Raleigh, February 10, 1906. Several.

Family LYGAEIDAE Kirkaldy (=COREIDAE Leth. and Sev.).

Genus **CORYNOCORIS** Mayr.

C distinctus Dallas. Raleigh, in November.

Genus **ARCHIMERUS** Burmeister.

A. calcarator Fabr. Raleigh, in September and October. Rare.

Genus **ACANTHOCERUS** Palisot de Beauvois (=**Euthoctha** Mayr.).

A. galeator Fabr. Raleigh, April to June.

Not uncommon in suitable situations.

Genus **ACANTHOCEPHALA** Laporte de Castelnau (= **Metapodius** Auctt.)

A. terminalis Dallas. Raleigh, June 5, 1905.

One specimen only.

A. femorata Fabr. Raleigh.

This and the preceding are not uncommon from May to October. The junior author had on January 30th of this year

a living specimen of this species, which was put in a bottle with some green leaves in October of last year (1906), and had since then been subject to freezing temperatures several times, surviving them till the date mentioned.

Genus **LEPTOGLOSSUS** Guérin.

L. phyllopus Linné. Raleigh.

Has been taken on Yucca in May and June; on asparagus in June; on *Datura stramonium* August 19 to November 2. It sometimes infests tomatoes. From what he noticed of the adults in the autumn of 1906, the junior author is of the opinion that they do not hibernate either as adults or nymphs.

L. oppositus Say. Raleigh.

Has been taken in July on plum, and later on on *Datura*. Two or three were taken in sunny places among dead leaves on October 26, 1906.

L. corculus Say. Raleigh.

One specimen on November 10, 1606. Another taken on March 1, 1904, was found under a log, apparently hibernating.

Genus **CHARIESTERUS** Laporte de Castelnau.

C. antennator Fabr. Raleigh.

Found in May to July and in September.

Genus **ANASA** Amyot and Serville.

A. armigera Say. Raleigh.

June to October. Not as common as *tristis*.

A. tristis DeG. Raleigh.

Occurs on squash vines from June (the first adults and eggs were noted on June 5, 1906), till September. Hibernates under bark.

Genus **ALYDUS** Fabricius.

A. eurinus Say. Raleigh, September 22, 1904.
A. pilosulus H. S. Raleigh.

This and the preceding occur from June to December; and in November and December may be found *in cop.* in sunny places.

A. quinquespinosus Say. Raleigh.

Two specimens only, both taken in September.

Genus **HARMOSTES** Burmeister.

H. reflexulus Stal. Raleigh.

Taken in May, June, August, September and November.

Family CIMICIDAE (= PENTATOMIDAE Auctt.).

Genus **CORIMELAENA** White.

C. nitiduloides Wolff. Raleigh, May 29, 1905.
C. gillettii Van Duzee. Raleigh, June 8, 1905.

One only of this interesting species, which was very kindly determined for us by its author.

Genus **TETYRA.**

T. bipunctata H. S. Raleigh, April 15, 1904, and April 4, 1906.

Genus **HOMOEMUS** Dallas.

H. grammicus Wolff. Raleigh, June 3, 1904.

Genus **PODOPS** Laporte de Castelnau.

P. cinctipes Say. Raleigh, January, 1906.

Genus **PANGAELUS.**

P. uhleri Signoret. Raleigh, April 22.

One specimen only.

Genus **SCHIRUS** Amyot et Serville.

S. cinctus Pal. Beauv. Raleigh, March 4, April 20, May 31, and June 2, 1904.

This appears to be a common form.

Genus **BROCHYMENA** Amyot et Serville.

B. quadripustulata Fab. Raleigh, June 14, 1904.

Very common under bark of dead pine trees in company with wasps of the genus *Polistes*. Outnumbers the next species ten to one.

B. myops Stal. Raleigh, in November, December, January and April.

Of this species, so rare that at the date of his annotated list in 1903, Mr. Van Duzee had not seen the form, long series have been taken under bark. Excepting *quadripunctulata* it appears to be the commonest form of the genus about Raleigh. Its chosen habitat appears to be in the neighborhood of streams.

The determination of the species is due to the valued courtesy of our friend, Mr. E. P. Van Duzee.

B. harrisii Uhler. Raleigh, November 30, 1905.
B. annulata Fabr. Raleigh, November 20, 1905.
B. arborea Say. Raleigh, April 29, 1905.

Genus **PERIBALUS** Mulsant et Riley.

P. limbolarius Stal. Raleigh, October 23, 1903, October 12, 1904.

This has not been recorded previously from N. Carolina.

Genus **TRICHOPEPLA** Stal.

T. semivittata Say. Raleigh, June, July, October, November. Not common.

Genus **MORMIDEA** Amyot et Serville.

M. lugens Fabr. Raleigh. Occurs commonly from May to December.

Genus **OEBALUS** Stal.

O. pugnax Fabr. Raleigh, March to October. Common.

Genus **EUSCHISTUS** Dallas.

E. tristigmus Say. Raleigh. Occurs from April to July and in October and November.

Var. *pyrrhocerus* H. S. Raleigh, August 3, 1904.

One specimen of this southern form of our commonest species.

E. servus Say. Raleigh. Taken from April till October, and also in January.
E. ictericus Linné. Raleigh, August 3, 1904. One specimen.

Genus **PROXYS** Spinola.

P. punctulatus Pal. Beauv. Raleigh, March 2, 1904.

Genus **HYMENARCYS** Amyot and Serville.

H. nervosa Say. Raleigh, in March, April, May and July. Not very common.
H. aequalis Say. Raleigh, June 3, 1904.

Genus **NEOTIGLOSSA** Kirby.

N. sulcifrons Stal. Raleigh, May 2, 1905.

Genus **COSMOPEPLA** Stal.

C. carnifex Fabr. Raleigh. Taken in July by Mr. Franklin Sherman.

Genus **THYANTA** Stal.

T. custator Fabr. Common about Raleigh from April to December.

Genus **MURGANTIA** Stal.

M. histrionica Hahn. Common from April to November in the vicinity of Raleigh.

Genus **NEZARA** Amyot and Serville.

N. hilaris Say. Raleigh, May to October. Not common.

Genus **BANASA** Stal.

B. dimidiata Say. Raleigh. Taken by Dr. E. B. Wilson, May 29, 1906.

Genus **STIRETRUS** Laporte de Castelnau.

S. anchorago Fabr. Raleigh, May 24, June and July 2, 1902.

Genus **MINEUS** Stal.

M. strigipes H. S. Raleigh, May 2, 1906, and May 3, 1904.

Genus **PODISUS** Herrich-Schaeffer.

P. maculiventris Say. Raleigh. In April, and August to October. Not uncommon.

Genus **EUTHYRHYNCHUS** Dallas.

E. floridanus Linné. Southern Pines, Manee collector; and Southern Wake Co, July 3, 1906, by F. Sherman.

An absolutely sure method of preservation of natural scientific collections against insect enemies.

By Geo. W. Bock. M. D.

Years ago, when I commenced to collect Coleoptera, I frequently found my treasures destroyed by larvae of *Anthrenus*, *Dermestes*, *Trogoderma* and other insect enemies, and I asked my friend, the late Hugo Soltau, an as enthusiastic entomologist as ever lived, for a good and reliable preservative. He advised me to read an article written by John Leconte, published in the American Naturalist, Vol. iii, A. D. 1870. In consequence I tried all chemicals mentioned, painted the boxes inside, sprayed the beetles, etc., but without the promised results. Some of the procedures were connected with so many disadvantages as to make them impracticable, others again too elaborate to be of practical use. Soltau himself used so-called moth-balls, containing mostly napthaline, but I found them absolutely without any value. I even once saw an *Anthrenus* larva crawling lustily on top of one of these cones. Subsequently I experimented with other drugs and found that the following methods of disinfecting infected material and treatment of the collection boxes will keep the collection absolutely free of any insect pest.

I disinfect every bit of material that is sent to me before mounting it and placing it in the collection. The method I use for this purpose is not my own, and was recommended by Riley. I place the material in an air-tight box (a well-made Smith-box will do), in the middle of which I place a glass or porcelain cup (such a one that is used for holding microscopical preparations, about one to two inches in diameter and one inch high will do), fill it partly with bisulphide of carbon and allow the material to stay in closed box for twenty-four hours. Do not operate with the bisulphide near an open light as it is very explosive. After this treatment I mount the material and put the insects in the collection boxes. In each of these boxes I place a common thimble, to the base of which I have soldered a short and strong pin, so as to stick the thimble in a corner of the box. I fill this little receptacle loosely with medicated cotton (entfettete Watte) and then pour in coal tar creosote so that the cotton is perfectly soaked with the drug. The thimbles have to be refilled about every six or twelve months. I generally use for filling them up a common glass dropper which can be had in any drug store, two for five cents. I have made experiments with this creosote by placing common cigar boxes filled with coleoptera on the table in an exposed room, the boxes being partly open because the covers do not close air-tight at all, and allow all kind of small insects to enter. I simply allowed half a teaspoonful of creosote running over the cork covering the bottom of the boxes, and kept them in that way absolutely free from any pest, while other boxes full of insects, but not treated with the drug, showed in a short time the ravages of different coleopterous enemies. I even found one box, having been treated three years previously with creosote, entirely free from any pest. In this method we surely find simplicity, inexpensiveness, with absolute safety for the collection combined.

PROF. J. H. COMSTOCK, of Cornell University and President of the Entomological Society of America, sails for Italy this month, and will in addition probably make a trip up the Nile. He has been given a sabbatical leave of absence by the University.

A New Species of Ceuthophilus (Orthoptera) from Kansas.

By James A. G. Rehn.

Ceuthophilus tuckeri n. sp.

Type: ♂; Lawrence, Douglas County, Kansas. October, at night. (E. S. Tucker.) [Coll. Univ. of Kansas.]

Allied to *C. secretus* and *varicator* Scudder, but differing from the former in the cephalic femora being less than half again as long as the pronotum, in the caudal femora being but slightly more than three times as long as broad, in the broader ventral sulcus of the same and in the longer median internal calcaria. From *varicator* it differs in the slightly broader caudal femora, in the spined latero-ventral margin of the caudal femora and in the much smaller size.

General size medium; form moderately compressed, dorsal outline distinctly arcuate; surface smooth. Head with the fastigium sharply descending, almost vertical, not sulcate, apex rounded; eyes subpyriform, the greatest width dorsad; antennae about three times as long as the body, proximal joint broad. Pronotum, with the cephalic margin slightly emarginate mesad, caudal margin truncate. Mesonotum slightly produced, arcuate; metanotum subtruncate. Terminal dorsal abdominal segment with a slightly elevated and thickened margin mesad; cerci slightly shorter than the pronotum, tapering, curved. Cephalic femora about a third again as long as the pronotum, ventro-cephalic margin with one to two spines on the distal portion, ventro-caudal margin unarmed; cephalic tibiae with the dorsal face unarmed, ventral margins with four spines; cephalic metatarsi slightly shorter than the remaining cephalic tarsal joints. Median femora about equal to the cephalic femora in length, ventro-cephalic margins with two distal spines, ventro-caudal margins with a single distal spine; median tibiae with two pairs of spines dorsad and five pairs ventrad including a terminal pair; median metatarsi about equal in length to the remaining median tarsal joints. Caudal femora very slightly longer than the normal length of the body, the greatest width contained slightly more than three times in the length and also placed at about a third the distance from the proximal extremity, ventral sulcus rather broad and comparatively shallow, the lateral carina with two large spines and a number of smaller ones placed distad and proximad of the larger ones, internal carina with a number of irregular small serrato-dentate spines; caudal tibia about a fifth again as long as the caudal femora, dorsal carinae with four pair of strongly divergent spurs, margins serrato-dentate, terminal calcaria three-paired, the median one on the lateral aspect three-fourths the length of the metatarsus, the me-

dian on the internal aspect equaling the greatest length of the metatarsus, ventral pair of calcaria on both sides shorter than the dorsal pair; caudal metatarsi as long as the remaining tarsal joints.

General color buff-yellow, overlaid with maculations of clove brown, the light color darker on the thorax than elsewhere and more tawny. Eyes and fastigium dark, a pair of fine irregular diverging dark lines extending caudad from the fastigium; antennae and palpi pale. Pronotum with median and lateral pale patches, the median ornament resembling a pair of *fleur-de-lis*, one directed cephalad the other caudad; lateral blotches irregular in shape, rather large and with a number of smaller pale spots in the immediate vicinity or in contact with them; ventral margin pale. Mesonotum and metanotum each with median and paired lateral blotches, rather irregular in shape but well defined, and with the ventral margins pale. Abdomen chiefly dark. Cephalic and median femora infuscate distad. Caudal femora with the scalariform pattern very distinct and well contrasted with the base color; caudal femora somewhat infuscate.

MEASUREMENTS.

Length of body	12.	mm.
Length of pronotum	4.	"
Length of cephalic femur	5.2	"
Length of median femur	5.2	"
Length of caudal femur	12.5	"

The type is the only specimen of this species seen. I take pleasure in dedicating the species to Mr. Tucker, of the University of Kansas, who collected the type.

DR. L. O. HOWARD states that the drawings for the full page plate illustrating his article in the Nov. number were made by Mr. R. E. Snodgrass.

BEETLES FROM BEE CELLS.—In the examinations of the cells of wasps and bees I occasionally find the larvæ of beetles under such conditions as leave no doubt that their presence there is not wholly accidental. When the cells are opened these beetle larvæ usually do not mature, but in the following five instances they were successfully hatched out. In every specimen the food stored in the cells was completely consumed and no trace of the bee larvæ was to be found. The cells were in every instance capped so that the probability of the beetle larvæ having accidently entered was certainly eliminated

Nemognatha dubia Lec. from the cell of *Anthidium emarginatum*. *Nemognatha scutellaris* Lec. two specimens, one from *Alcidamea producta* Cress. and the other from a *Xylocopa* probably *X. orpifex*. *Rhipiphorus cruenius* Germ. from a cell resembling that of an *Ancistrocerus*.

These beetles were identified by Prof. H. C. Fall.—A. C. DAVIDSON, M. D., Los Angeles, Cal.

On the Distribution and Habits of some West African Bees.

By F. Creighton Wellman.

Some months ago I sent a small collection of Angolan bees to Professor Cockerell for determination. He has very kindly written me full information regarding them and, as none of them have heretofore been reported from this region, about half the insects being, in fact, new to science, I have thought that my field observations (which include careful notes of the plant relations and exact localities where the specimens were found) might be of interest. The numbers preceding the generic names refer to the order in which the species stand in my collecting record. The new species are marked with an asterisk (*).

179. *Apis nigritarum* Lep. Chiyaka, Angola, Dec. 20, 1906. Early rainy season. At Long. E. 15° 05′, Lat. S. 12° 44′; altitude 5000–6000 feet. Taken at various flowers, chiefly Leguminosae. This is the native domestic honey bee. The blacks make hives for it of bark, which they hang in trees. The honey is of a very pleasant flavor, especially near forests of "Omone" trees (*Brachystegiae*). These insects are of some economic importance, as beeswax is one of the chief exports of the Colony.

92. *Trigona* sp. Chiyaka, July, 1906. Very fond of damp places. Also when any gum-bearing tree is cut they appear in great numbers. The specimens sent Professor Cockerell were taken on a newly fallen gum tree (*Pterocarpus erinaceus*) in company with many Diptera, among which were *Sarcophaga albofasciata*, *S. africa*, *Anthomyia desjardensii* and *Pycnosoma chloropyga*. These bees make a very decent honey.

*174. *Megachile caricina* Ckll. Chiyaka, Dec. 20, 1906. On flowering sedges by the side of a small stream.

*170. *Gronoceras wellmani* Ckll. Chiyaka, Dec. 20, 1906. Taken at a flowering mint (*Aeolanthus suavis*).

*172. *Gr. benguellensis* Ckll. Chiyaka, Dec. 20, 1906. On Compositae (*Othonna spp.*, *Geigeria wellmani*, etc.).

171. *Anthophoa quadrifasciata* Vill. Chiyaka, Dec. 20, 1906. Stands motionless in the air like a bat fly. Taken near Con-

volvuli (*Ipomaea crassipes*) but not actually seen in the flowers. Makes its nest in the ground.

*175. *An. convolvuli* Ckll. Chiyaka, Dec. 20, 1906. On Convolvulus.

*177. *Crocisa wellmani* Ckll. Chiyaka, Dec. 20. 1906. On *Acolanthus* and also on *Orthosiphon sp.* (*? violaceus*). I think this species is parasitic on *Anthophora convolvuli* (No. 175), but I have not yet definitely proven it.

178. *Cr. meripes* Vach. Chiyaka, Dec. 20, 1906. On *Acolanthus*. At Professor Cockerell's suggestion I have followed up the habits of this species and find that it is parasitic in the nests of *Anthophora quadrifasciata* (No. 171).

90. *Xylocopa tarsata* Sm. var. *wellmani* Ckll. Bailundu, Angola, February and March, 1906. Middle of rainy season. At Long. E. 16°, Lat. S. 12° 13′ 30″. Altitude 4761 ft. Taken at various Malvaceae, principally *Gossypium spp.*

89. *Mesotrichia mixta* Rad. Chiyaka, July, 1906. Seen at several flowers. The specimens sent were taken at a species of *Millettia*, of which they are very fond.

180. Note on a Mite Found Infesting *Mesotrichia mixta*. After receiving Professor Cockerell's notes on *Mesotrichia*, I dissected several specimens of *mixta* and in each case found a peculiar pouch, opening on the basal surface of the first abdominal segment, full of mites. I sent the contents of one of these pouches (16 mites) with the specimens of bees, and they have been identified as *Paragreenia*.

SUPPLEMENTARY NOTE.—The new species have been described in Annals and Magazine of Natural History, 1907. The *Trigona* I have failed to identify, but hesitate to describe as new. It is nearly 6 mm. long, black, with light ferruginous hair on thorax above; clypeus shining, with an orange mark at each side; basal half of scape largely red; a yellow stripe along inner orbits; a yellow line or band circling thorax, on upper edge of prothorax, and margins of mesothorax and scutellum; first two additional segments with a large cream colored spot on each extreme side; second abdominal segment extremely shiny. There are two entire submarginal cells. *Paragreenia* Ckll. n.n., is *Greenia* Oudemans, 1900 (not Kirby)=*Greeniella* Banks, 1904 (not Ckll.). The mites, which probably represent a new species, were sent to Mr. Banks.—T. D. A. COCKERELL.

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

To Contributors.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, three weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form, will be given free, when they are wanted; and this should be so stated on the MS., along with the number desired. The receipt of all papers will be acknowledged.—ED.

PHILADELPHIA, PA., DECEMBER, 1907.

This number completes the eighteenth volume of the NEWS with 456 pages and 17 plates. In other words it has been in existence for eighteen years. It had a few trials in its early days but warm friends came to the rescue. Its growth has been steady and normal, and has gone along with the increased interest in the study of insects. We see no reason why the journal should not continue to be enlarged and improved, as our subscription list is larger this year than ever before. We feel that we are not receiving enough papers of a general and popular interest. We do not wish to discourage technical papers, but desire the other kind too. We fully realize that there is more in entomology than the description of new species, and we would welcome more papers on habits, collecting experiences, life histories, or the part of the study that makes interesting reading yet does not lack scientific value. Nature stories with the fake part left out would probably explain the idea. The nature-fake stories have illustrated the fact that people care for them and will read them. Can it be that the truth is less interesting? We will be glad to hear from our subscribers who have interesting material for publication. We know that many of them could supply such articles, but perhaps their modesty forbids or they think their observations are not new. We are willing to risk censure if we republish interesting facts.

Entomological Literature.

THE GENUS EUTETTIX WITH ESPECIAL REFERENCE TO THE BEET LEAF HOPPER, A TAXONOMIC, BIOLOGIC AND ECONOMIC STUDY OF THE NORTH AMERICAN FORMS.—By Elmer Darwin Ball, Ph.D.

Reprinted from the Proceedings Davenport Academy of Sciences, vol. xii, pp. 27–94, July, 1907.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

MAJOR JAMES CARROLL, Surgeon, U. S. A., died September 16th, in Washington, D. C. Major Carroll was a member or the commission that proved that mosquitoes transmitted the cause of yellow fever to human beings. All honor to his memory.

CAMBRIDGE ENTOMOLOGICAL CLUB.—The Club held an exhibition of Insects on Wednesday, Thursday, Friday and Saturday, November 20, 21, 22, 23, at the rooms of the Appalachian Mountain Club, in the Tremont Building, 73 Tremont St., Boston.

THE office of State Entomologist has been separated from the chair of Zoology and Entomology of Clemson College and located at Columbia, S. C. On September 11, 1907, Prof. Chas. E. Chambliss resigned his position of Assistant Professor of Zoology and Entomology to accept the appointment of State Entomologist.

CAPTURES OF DIPTERA.—The following of my captures of flies during 1907 are of interest; *Dizonias tristis*, Washington, D. C., June 21; *Volucella obesa*, Glencarlyn, Va., June 28; *Pterallastes thoracica*, Glencarlyn, Va., June 14, at *Ceanothus; Gymnochaeta alcedo*, Falls Church, Va., July 20; *Pterocalla strigula*, Washington, D. C., September 5; and, *Pseudotephritis cribellum*, Falls Church, Va., September 30. I also took a few more specimens of *Cordiligaster minuscula* and *Cyrtometopa ferruginea*. The former is fairly common at some places along the Potomac river, five or ten miles above Washington.—NATHAN BANKS.

OCCURRENCE OF DILAR AMERICANA MCLACH.—This rare Neuropteron of the family Hemerobiidae was described from one female taken by Sanborn in Kentucky. The type and only recorded specimen is now in the Museum of Comparative Zoology. On July 20, last summer, while collecting in an open woods near Falls Church, Va., I saw three fluffy-winged little insects on the bark of a large tree. I placed a vial over two, the third flying away. Once dead, I recognized *Dilar americana*; a male and a female. The male resembles his mate, but is rather smaller and darker, and of course, with the pectinate antennae characteristic of the males of this genus.—N. BANKS.

WHILE opening a box of hydrochinone developer a few days ago, I found therein, on the top of the crystals, a well preserved specimen of *Plodia interpunctella*, which I suppose had accidentally gained access to the box and had died therein. On, however, emptying the box of its contents, I found near the bottom and adhering to the cardboard a well built chrysalis, the outer covering of which was composed of hyrochinone crystals, while the inner covering or sheath was composed of the usual silk web. What adds interest to the specimen, is the fact that the larva had evidently fed upon the hydrochinone crystals, as is evidenced by the presence of numerous excreta on the outside of the sheath in which pupation had finally taken place. I am aware that the larva of *Plodia interpunctella* is not very particular about what it eats, but to the best of my knowledge, this is the first that I ever heard of its feeding and thriving upon a chemical product. I will send you under separate cover a photo of the chrysalis.—JAMES H. STEBBINS, JR., 3 W. 29th St., New York.

GEOMETRID NOTES.—Having occasion to go over some of the Packard types I noticed his type of *Gonodontis apiciaria* was very distinct from *warneri* of Harvey Bull. Buff. Ent. Soc. II, 121, 1874, and is incorrectly placed as a synonym of the latter. Packard described the species from 2 ♂ and 2 ♀ and among these he has *warneri*, but the ♂ figured, Plate 12, fig. 9, is the true type of *apiciaria*. He refers to this in the description, page 502 of Monograph, where he says: "Accompanying and beyond this line is a broken broad diffuse band (here he refers to *warneri*) often obsolete, in one ♂ entirely so (here to *apiciaria*). The true *apiciaria* is very distinct in that there is a deep sinus in the hind wings of ♂ and ♀, the portion beyond the extra discal line of fore and hind wings is pale ash gray and reddish inwardly. The extra discal line is never sinuous and runs almost straight across the wings and farther in, than in *warneri*. It lacks all shading to extra discal line and the costal apical spot is wanting. In fact *apiciaria* is so distinct that it could not have even varietal standing but must be placed in specific rank. It is rather a rare species as I know of only about eight specimens, three being in my collection the others scattered through the country. Perhaps I am more fortunte than most people working on the Geometridæ to have access to the Packard types in Cambridge and I would like to state here for the benefit of those who may visit there, that all specimens labeled types, are not true types. Packard was in the habit of putting type labels on everything meaning typical of his collection even to specimens of the same species added to his collection after his description. But fortunately he was extremely careful in labeling so that if one goes by the original descriptions he can easily locate the types by locality and date. I speak of this so that there may be few chances in the future for errors in this difficult group. I wish to thank Mr. E. J. Smith, of Natick, Mass., for courtesy in extending to me the use of his specimens and records.—L. W. SWETT.

BIRDS VS. INSECT.—The following letter is self-explanatory. The insect referred to proved to be the common giant water bug or electric light bug (*Belostoma americana*). The predaceous habits of this insect are well known. Numerous instances are recorded in literature of its attacking fishes, but that it attacks birds has not, so far as I know, been previously recorded. In order that this observation may be more widely known, Mr. Lawrence has kindly given me permission to use his letter.—ROBERT MATHESON, 804 E. Seneca St., Ithaca, N. Y.

Huron, South Dakota, May 17, 1907.

HON. ROBT. L. SLAGLE,
Pres. S. D. Agricultural College,
Brookings, South Dakota.

MY DEAR MR. SLAGLE:—I have a curiosity which I am sending you under separate cover and will explain the circumstances under which I obtained it.

About one o'clock to-day, the man I have working around my yard came to me with a woodpecker in his hand. The special species of woodpecker I am unable to tell you; the ordinary woodpecker, or "flicker" as we sometimes call it, that runs up and down trees and hunts out bugs and worms, etc. The man told me, while he was standing near a tree this woodpecker uttered cries of distress and fluttered and fell down out of a tree near where he was standing. On picking the bird up he was surprised to find a very large bug attached to the woodpecker's head. That is, the big bug had inserted its beak, or whatever it may be, into the back part of the head of the woodpecker, apparently through the skull, and when it came to me the insect was firmly attached to the woodpecker's head in that way, and was industriously engaged in sucking the blood or brains of the woodpecker. In addition to the insertion of its beak into the back part of the skull of the woodpecker, it had wrapped its several pairs of long claws or legs clear around the bill of the woodpecker, holding it as in a vise.

My hired man put his foot on the insect to make sure of killing it, and we detached it from the bird and send it down to you to inquire what the "animal" is, and if you know anything about the habits, if it is something you people can name, and if they are in the habit of dining on woodpeckers and other birds, or whether it might have been a case of misplaced confidence on the part of the woodpecker, who may have tackled the insect and the insect was too much for him. Whatever it may be, I am quite curious to hear what your people say about it, and if you are familiar with this late addition to the South Dakota products. I am sending you the insect under separate cover, and if you think it worthy of attention I should be glad to hear from you regarding the same.

Yours sincerely,

PHILIP LAWRENCE.

THE ENTOMOLOGICAL SOCIETY OF AMERICA.—Announcement of Annual Meeting at Chicago. The Entomological Society of America will hold a meeting December 30 and 31, at the University of Chicago, in connection with the meetings of the American Association for the Advancement of Science and the other affiliated scientific societies. Members are urged to be present and to contribute to the program. Abstracts of proposed communications should be mailed to the Secretary at the earliest moment, otherwise they may not be received in time for inclusion in the joint program of all the societies which is to be printed this year.

The by-laws provide that there shall be held at the annual meeting a technical exhibit of entomological materials and methods. Any photographs, drawings, specimens, novelties, apparatus or other matter of interest to entomologists which persons may wish to exhibit will be heartily welcomed.

This exhibit will remain open the entire period of the meeting, for the examination, at their leisure, of those interested. If you cannot attend, send your exhibit to the Secretary, in care of the American Association for the Advancement of Science, at the University of Chicago. The annual address will be given by Professor Herbert Osborn, of the Ohio State University on Monday evening, December the thirtieth. The business meeting will be held Tuesday morning, December the 31st. The same hotel arrangements and railroad rates enjoyed by members of the American Association and other societies will be accorded to the members of our society. While it is too early to make definite announcements in regard to these, it has in the past, and presumably again will be, the custom of the railroads to grant a rate of one fare and one-third + twenty-five cents for the round trip. Ask your agent for a certificate upon purchasing your ticket, and this must be validated by the special agent in attendance at the meetings, for which a fee of twenty-five cents will be charged. You will then be sold a return ticket for one-third the regular fare.

The meetings of the Association of Economic Entomologists will be held on Friday and Saturday, December 27 and 28. Blanks for the abstracts of papers to be read, for titles of proposed exhibits, and for nomination of new members will be sent upon request.

J. CHESTER BRADLEY,
Secretary-Treasurer.

J. H. COMSTOCK,
President.

RANDOM ENTOMOLOGICAL NOTES.—The larva of *Sibine stimulea* Clemens has been found by a correspondent at Latrobe, Pa., feeding upon the leaves of the Castor oil plant (*Ricinus communis*). This is believed to be a new record.

From a correspondent in Wisconsin the writer recently received a quill containing a number of the eggs of *Erebus odora*. A male and a female of this species were captured and placed in a box. The female oviposited and the eggs proved to be fertile. Unfortunately the writer

was not at home when the eggs were received. Upon his return he found that the larvæ had already escaped from the eggs. A diligent attempt was made to find some food-plant upon which they would feed, but every effort failed. Plants belonging to over thirty families were tried, but without success. Unfortunately the fact that the larva feeds upon plants of the genus *Cassia* was overlooked. This should be borne in mind, hereafter by those who may be as fortunate as was my correspondent in securing ova of this species in the northern states.

The small larvæ are loopers, distinctly geometrid in appearance. The head is long vertically and narrow transversely. They were black in color with the anal prolegs, which are elongated of a pale reddish color.

The army-worm, *Leucania unipuncta,* has been very numerous this summer in the eastern suburbs of the city of Pittsburgh. Several fields of grass and growing grain seen by the writer at the end of June and early July were almost completely defoliated by the larvæ, which were present in incredible numbers.

The hispid beetle *Odontota dorsalis,* Thumberg, is always common in Western Pennsylvania upon the leaves of the locust trees, *Robinia pseudacacia,* but this year they have been present in unusual numbers. Inquiries have been frequently addressed to the writer as to these insects, and along the upper waters of the Ohio, at Sewickley, Pa., and other suburban localities the locust trees have in places been almost stripped of their leaves by them. A single stroke of the beating pole will sometimes bring a thousand individuals down into the umbrella of the collector.—W. J. HOLLAND.

ERRATUM.

Page 261, line 19, for "Cicindelidae" read "Coccinellidae."

Doings of Societies.

A meeting of the American Entomological Society was held June 27, 1907. Dr. P. P. Calvert, President, in the chair. Thirteen persons were present.

Mr. Laurent said insects became more abundant this year in Florida during March. He said he believed the best season in that State was om the middle of April to the middle of July.

Dr. Calvert asked whether northern species found in the tropics have the same number of annual broods as here, or do the broods follow in continuous succession. Discussed by the members.

Mr. Fenninger reported the capture of *Microdon aurifex*, taken at the Forked River Mountains, N. J., July 9, 1906. It was said not to have previously been taken north of Mexico.

Dr. Calvert exhibited male and female specimens of *Argia translata* from Ecuador. They did not show any geographical variation from those found in the United States. He commented on the wide geographical range of the species. He also showed a male *Perilestes* from Surubres, Costa Rica, by Professor Biolley, a genus hitherto known only from Essequibo, Guiana, and Brazil, and pointed out its chief venational characters.

Mr. Viereck recorded *Hermetia illucens*, a South American Dipteron, taken at Philadelphia. He also said *Andrena nasoni* showed considerable geographical variation. The western forms may be considered as two subspecies. Other species of *Andrena* which also show geographical variation were mentioned.

Mr. Rehn said some species were more plastic than others, and this fact should be considered.

A meeting of the American Entomological Society was held October 10th. Dr. P. P. Calvert, President, in the chair. Thirteen persons were present.

Mr. Viereck said he saw a frog at Tucker's pond, near Devon, Pa., in the act of swallowing a dragon fly. He rescued the insect and found it to be *Gomphus sordidus*. This habit of a frog was new to the speaker.

Mr. Haimbach recorded the capture by Mr. Harbeck of *Caripeta angustiorata* at Clementon, New Jersey, in May.

Dr. Calvert exhibited an egg capsule of one of the larger cockroaches, *Periplaneta* or *Blatta*, which had been firmly attached to the fluted moulding of a bookcase in such a way that the capsule lay in a vertical groove whose width was about equal to the height of the capsule, the longest axis of the capsule being vertical. The mother had almost covered the exposed surface of the capsule with white paper (although the moulding was dark brown), which had evidently been obtained from a newspaper hanging near by, as the paper had been

gnawed into several holes, the nearest hole being a half inch from the egg capsule. When the speaker first saw the capsule he did not recognize it owing to its white color, and pulled it off with a forceps, part of the capsule wall remaining on the moulding. The capsule being thus opened, the embryos, which were nearly ready to hatch, began to free themselves, when the speaker dropped the whole into Gilson's acetic alcohol sublimate mixture, which killed and fixed the embryos in their natural positions. He also spoke of his most recent work on the Odonata for the Biologia Centrali-Americana as being that of summarizing the geographical distribution of the species with reference to elevation, temperature, rainfall and drainage-slopes. The numbers of species found in the different States of Mexico were given to show in what parts of that country our knowledge was most deficient.

Dr. F. Creighton Wellman of Benguella, West Africa, was elected a member. HENRY SKINNER, *Secretary*.

A meeting of the Entomological Section of the Academy of Natural Sciences of Philadelphia was held May 23d, Mr. Philip Laurent, Director, presiding. Twelve persons were present. Dr. Calvert exhibited specimens of *Libellula*, and said *flavida* Ramb. had been described from an unknown locality. The species identified by Hagen as *flavida*, was not the *flavida* of Ramb. The speaker had redescribed the *flavida* of Hagen under the name *comanche*. Dr. Calvert asked where the most southern forms of insects were found in Pennsylvania. The prevailing opinion among the members present was that the lower Susquehanna valley gave more of these forms than any other locality.

A meeting was held Sept. 26th, Mr. Laurent, Director, presiding. Fourteen members and two visitors were present. Mr. Laurent exhibited a specimen of *Celithemis fasciata* taken at Malaga, N. J., July 20th. Specimens of this species have been taken by Mr. Daecke in other localities in the same State. Mr. Rehn exhibited a specimen of *Chloealtis conspersa* taken by Mr. G. M. Greene, ovipositing in dead beech wood at Angora, Penna. This is the first record south of the mountainous parts of the State.

Mr. Wenzel exhibited specimens of Coleoptera taken by his son, H. A. Wenzel, in the Huachuca Mountains, Cochise Co., Arizona. *Crioprosopus magnificus* and *Cicindela santaclarae*, the latter in both the green and brown forms, *Pasimachus mexicanus*, *Amblychila baroni* were shown. The latter were found under stones. Over fifty species of Coccinellidae were taken.

Dr. Skinner exhibited some Coleoptera from Manitoba and Saskatchewan, among them being *Cicindela manitoba*, *cinctipennis* and *limbata*.

Mr. Rehn spoke of his trip in the southwest in conjunction with Mr. Hebard. They brought back about four thousand specimens of Orthoptera. He said tubes were much better than envelopes for the grasshoppers. Some of the material was exhibited.

Mr. Daecke exhibited *Orchelimum minor* which he found ovipositing in pine at Brown's Mills, N. J., Sept. 15th. He also reported *Dendrotettix quercus* from Bamber, N. J., Aug. 17th, heretofore not known from the Atlantic coast.

HENRY SKINNER, *Recorder.*

Meeting of the Brooklyn Entomological Society, 55 Stuyvesant Avenue, Brooklyn, New York, June 6th, 1907. President Dr. Zabriskie in the chair; sixteen members and three visitors present.

Mr. Dow continued his address delivered before the Society in April, on "The Dignity of Nomenclature." Fabricius, who was quoted as having followed in the footsteps of his tutor, Linnæus, had a coterie of children and young people, whose names he would sometimes apply to insects, as, for example, *"Vanessa"* and *"Thecla."* His adoption of popular terms, such as "woolly bear" or "wolf," can be recognized in *Arctia* and *Lycaena.*

Among the names by other authors mentioned as particularly appropriate were: *Hadena*, a nightflyer, by Schranck, and *Agrotis, field-workers*, by Ochsenheimer.

In a general discussion, following the address, the use of descriptive names was endorsed.

GEO. P. ENGELHARDT, *Rec. Sec.*

At the meeting of the Feldman Collecting Social, held on October 16th, at the residence of Mr. H. W. Wenzel, 1523 S. Thirteenth Street, Philadelphia, there were ten members present, and Mr. Peters visitor.

Dr. Skinner exhibited specimens of a local race of *Cicindela vulturina* from Fort Wingate, West New Mexico, which are larger, more heavily marked and darker green than the green variety of *vulturina* known as *santaclarae*. Black forms were also received.

Mr. Haimbach exhibited a few of the moths collected in the past summer by Messrs. Kaeber and Wenzel, Jr., in Southern Arizona, also a fine pair of *Caripeta angustiorata* Wlk., a rare Geometrid, collected by Mr. Harbeck at Clementon, N. J., May 30, '07.

Mr. Viereck said that out of about 250 specimens of Connecticut Braconidæ (Hymenoptera), recently examined by him, over fifty species proved to be new. Among the specimens were some species of *Lysiphlebus*, a genus that is parasitic on plant-lice, and that has been divided into species groups by Dr. Ashmead, on the number of joints to the antennæ. Mr. Coquillett, in an article in Insect Life, disputes the validity of some Ashmeadian species based on the above character, claiming that the number of joints to the antennæ is too variable to be of value, and gives, in support of his theory, observations made upon *Lysiphlebus* species bred from colonies of Aphids, of which the specimens of each colony were taken from the same bush. He examined over 100 specimens of *Lysiphlebus* from two colonies, and of this number less than four per cent. showed more joints on one antenna than on the other, of the same species. Mr. Viereck remarked that, in view of the fact that Mr. Coquillett's findings are not based on generations from known parents, he is inclined to regard Mr. Coquillett's view as a counter theory to that of Dr. Ashmead, and for the present prefers to stick to the latter.

Mr. Daecke exhibited his collection of Trypetidæ (Diptera), and spoke on the gall-making of some of the trypetid species.

FRANK HAIMBACH, *Secretary*.